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61. Proposed by WILLIAM E. HEAL, Member of the London Mathematical Society, and Treasurer of Grant County, Marion, Indiana.

Let the bisectors of the angles A, B, C of a triangle intersect in O and meet the sides opposite A, B, C in A', B', C'. Prove that the perpendiculars form O on the sides of the triangle $A'B'C'$ are $p_1=\frac{rR}{d_1}, p_2=\frac{rR}{d_2}, p_3=\frac{rR}{d_3}$ where r, R are the radii of the inscribed and circumscribed circles of the triangle ABC and d_1, d_2, d_3 are the distances of the center of the circumscribed circle from the centers of the escribed circles.

Solution by G. B. M. ZERR, A. M., Ph. D., Texarkana, Arkansas-Texas.

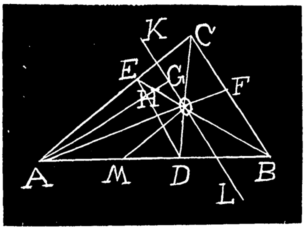
Using trilinear coordinates, equation to CD is $\alpha-\beta=0$; to BE, $\alpha-\gamma=0$.

$$\therefore \left(\frac{2\triangle}{a+b}, \frac{2\triangle}{a+b}, 0\right), \left(\frac{2\triangle}{a+c}, 0, \frac{2\triangle}{a+c}\right),$$

are the coordinates of D, E.

$\therefore$ $\beta+\gamma-\alpha=0$, is the equation to DE.

The distance from O, (r, r, r) from this line is,



$$p_1=\frac{r}{\sqrt{3abc+2\cos C-2\cos A+2\cos B}}$$

$$=\frac{r}{\sqrt{\dfrac{3abc+a^2c+b^2c-c^3-ab^2-ac^2-b^3+a^2b+bc^2+a^3}{abc}}}$$

$$=\frac{r}{\sqrt{\dfrac{abc+(a+b+c)(a+b-c)(a-b+c)}{abc}}}=\frac{r}{\sqrt{\dfrac{abc+8s(s-b)(s-c)}{abc}}}$$

$$=\frac{r}{\sqrt{\dfrac{abc(s-a)+8\triangle^2}{abc(s-a)}}}=\frac{r}{\sqrt{\dfrac{\dfrac{abc}{4\triangle}+\dfrac{2\triangle}{s-a}}{\dfrac{abc}{4\triangle}}}}=\frac{r}{\sqrt{\dfrac{R+2r_1}{R}}}=\frac{rR}{\sqrt{R^2+2Rr_1}}=\frac{rR}{d_1}.$$

Similarly $p_2=\frac{rR}{d_2}$, $p_3=\frac{rR}{d_3}$.

62. Proposed by F. P. MATZ, Sc. D., Ph. D., Professor of Mathematics and Astronomy in Irving College, Mechanicsburg, Pennsylvania.

Prove that two triangles are equal if they have two sides and *the median of one of them* equal, each to each.